EPA United States
Environmental Protection
Agency

Assessing Outdoor Air Near Schools
Tarrant Elementary School - Tarrant City, AL

Results and Analysis of EPA's monitoring

EPA selected this school for monitoring because it is located near a coke plant which is a source of air toxics emissions.   Computer models were used to determine which air toxics may be present at elevated levels in the outdoor air near the school. These models showed that lead and pollutants associated with coke plant operations, including benzene, arsenic, and benzo(a)pyrene, could be present in the air around the school and prompted EPA to test to see if the levels present may be of concern.

Primary Findings	Levels of levels of lead, a pollutant for which there are national standards for ambient (outdoor) air, are below the level of the national standard for protection of public health.
	Levels of pollutants associated with coke plant emissions, including benzene, arsenic, and benzo(a)pyrene and associated longer-term concentration estimates were not as high as suggested by the information available prior to monitoring. Although they were below the levels of significant concern that had been suggested by the modeling information, these results indicate the influence of these pollutants of concern emitted from nearby sources.
Key Pollutants Monitored	Lead. Inhalation and ingestion may affect the developing nervous system if people are exposed to high levels. Benzene. Inhalation of benzene at high levels can affect the bone marrow and can cause anemia and leukemia. Arsenic. Inhalation of arsenic at high levels can damage the respiratory system and cause lung cancer. Benzo(a)pyrene. Inhalation of benzo(a) pyrene at high levels can cause cancer.
Next Steps	Based on the analysis described here, EPA will not extend air toxics monitoring at this school.
	EPA remains concerned about emissions from sources of air toxics and continues to work to reduce those emissions across the country, through national rules and by providing information and suggestions to assist with reductions in local areas.
	The Jefferson County Department of Health (JCDH) will continue to oversee industrial facilities in the area through air permits and other programs.

Summary of Study Approach and Findings

Approach:

- A monitor collected air samples from August 5, 2009 through November 24, 2009 at the Tarrant Elementary School in Tarrant City, AL.
- We posted individual air sample results on this website throughout the monitoring period to keep your community informed during the monitoring period.
- During the monitoring period, we evaluated the monitored concentrations to see if there was a concern from short-term exposures (e.g., several weeks).
- When the monitoring was complete, we analyzed the results to see if there was a concern from long-term exposures (over a lifetime).
- Also, when the monitoring was complete, we evaluated all the air samples from the on-site monitor. We also evaluated information on wind speed and wind direction from a weather monitor at the school, along with historical weather information and information about nearby sources of lead, benzene, arsenic, and benzo(a)pyrene emissions.

Findings:

- **Levels of lead, a key pollutant for which there are national standards for ambient (outdoor) air, are below the national standard for protection of public health**
- **Measured levels of pollutants associated with coke plant emissions, including benzene, arsenic, and benzo(a)pyrene, and associated long-term concentration estimates were not as high as was suggested by modeling information available prior to monitoring. Although they were below the levels of significant concern for long-term exposure that had been suggested by the modeling, these results indicate the influence of these pollutants of concern emitted from nearby sources.**
- The process to identify schools for monitoring relied on emissions estimates and other information. Ambient air monitoring at the school allowed measurement of what was actually in the air.
- Information from the nearby coke plants indicates that they were operating below normal production levels, approximately 60%of the production levels of a year earlier and a year later. Although, information indicates pollutant emissions are not necessarily related to production at these coke plants.
- **Based on the analysis summarized here, EPA will not extend air toxics monitoring at this school.**
- Click here for additional information

How We Analyzed the Information We Collected at this School

The analysis considered whether the information collected at the school might raise concerns for the health of children or adults at the school. We looked at the following types of information:

- Measured lead, benzene, arsenic, and benzo(a)pyreneconcentrations and information on lead, benzene, arsenic, and benzo(a)pyrene
- Measured wind direction and wind speed at the school
- Information about nearby sources of lead, benzene, arsenic, and benzo(a)pyrene emissions

Analysis of Measured Lead Concentrations:

1. Calculate the average: We calculated the average of the lead (TSP) measurements for each of the 3-month periods in which monitoring occurred (the higher of these averages is shown by the black diamond in the graph below). We compared this average to the long-term comparison level (thick line on the graph below). The comparison level is the level of the national ambient air quality standards (NAAQS) for lead, which is for a 3-month averaging period.

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Result: The average lead level for the samples collected was well below the comparison level.   The health concern is low.

Tarrant Elementary School
Analysis: Lead (TSP) Average
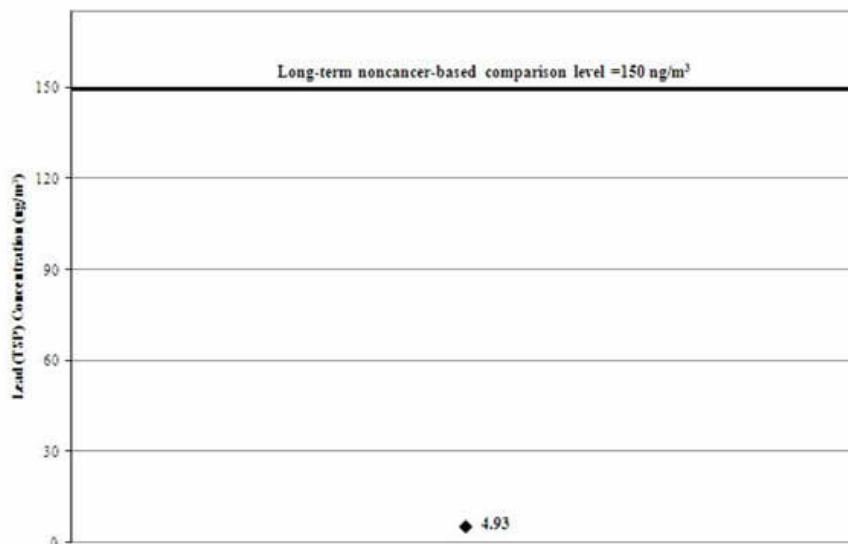
2. Calculate a range: To account for varying air concentrations of lead, we calculated a range around the average by estimating high and low values that the longer-term concentrations might reach using common statistical tools. We compared the highest point in the range (called the "upper bound") to the comparison level.

Result: The high end of the range is lower than the comparison level. The health concern is low.

### Tarrant Elementary School
Analysis: Lead (TSP) Range
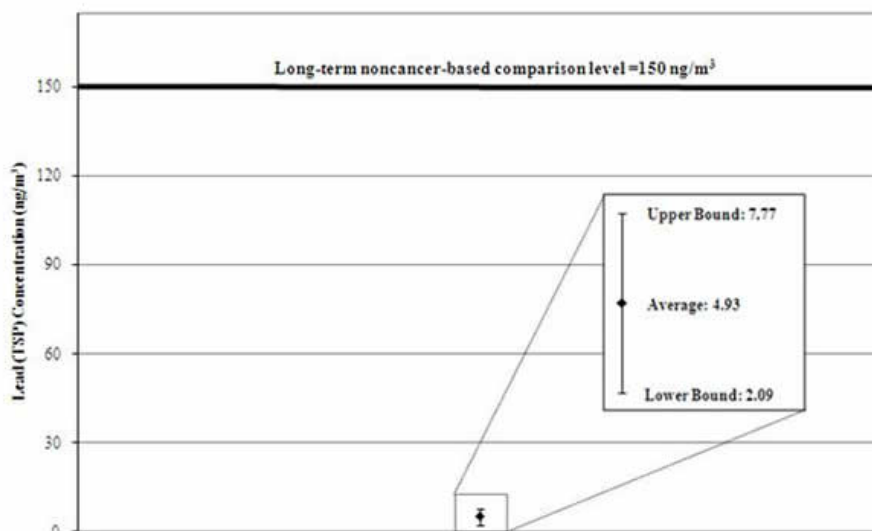
Analysis of Measured Concentrations of Other Pollutants:

Levels of the multiple pollutants associated with coke plant emissions, including benzene, arsenic, and benzo(a)pyrene were not as high as suggested by the information available prior to monitoring. Although they were below the levels of significant concern that had been suggested by the modeling information, these results indicate the influence of these pollutants of concern emitted from nearby sources.

1a. Calculate the benzene average: We calculated the average of the benzene measurements (shown by the black diamond in the graph below). We compared this average to the long-term comparison level (thick line on the graph below).

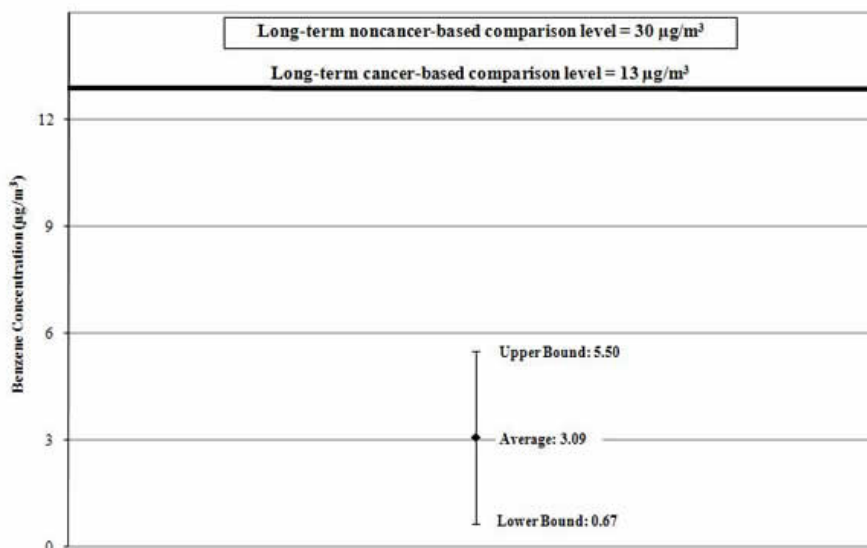**Result: The average benzene level for the samples collected was below the long-term comparison level.**

Tarrant Elementary School
Analysis: Benzene Average

Long-term noncancer-based comparison level = 30 µg/m³

Long-term cancer-based comparison level = 13 µg/m³

◆ 3.09
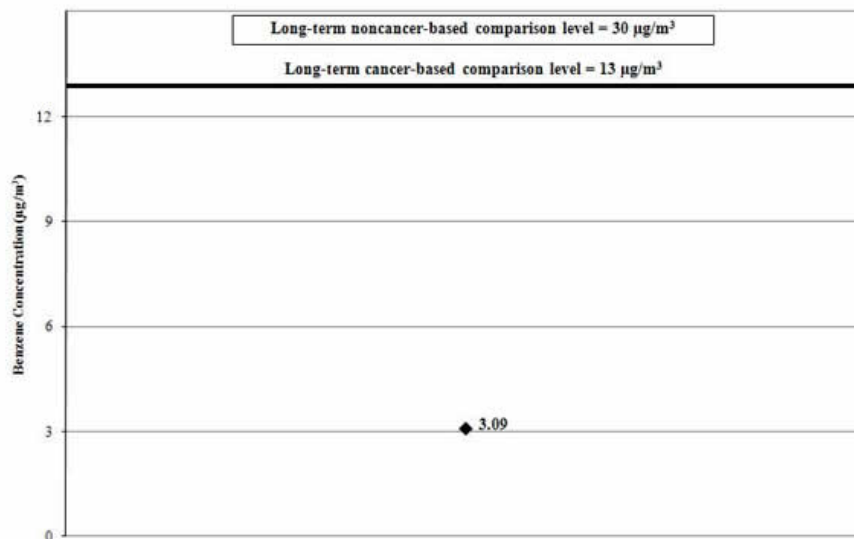
1b. Calculate a range for the benzene average: To account for varying air concentrations of benzene, we calculated a range around the average by estimating high and low values that the longer-term concentrations might reach using common statistical tools. We compared the highest point in the range (called the "upper bound") to the long-term comparison level.

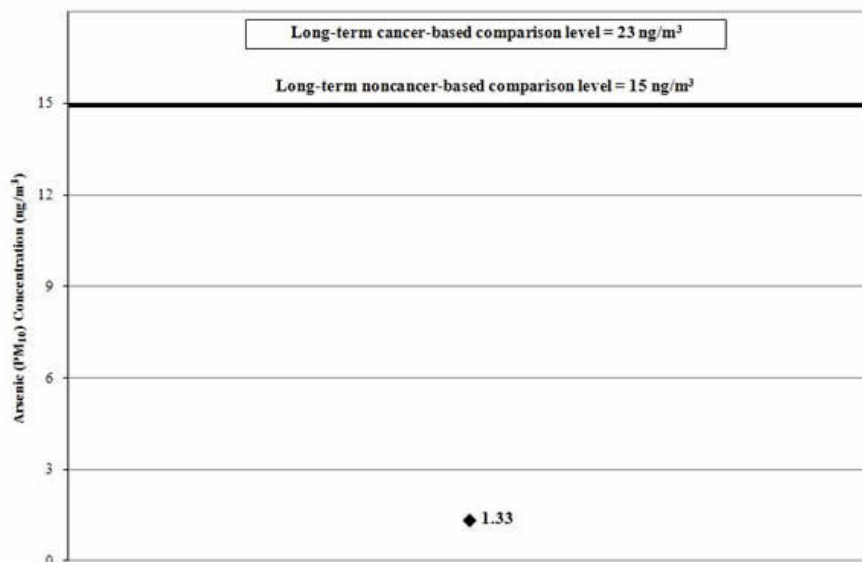**Result: The high end of the range is lower than the comparison level.**

Tarrant Elementary School
Analysis: Benzene Range

Long-term noncancer-based comparison level = 30 µg/m³

Long-term cancer-based comparison level = 13 µg/m³

Upper Bound: 5.50

Average: 3.09

Lower Bound: 0.67

2a. Calculate the arsenic average: We calculated the average of the arsenic measurements (shown by the black diamond in the graph below). We compared this average to the long-term comparison level (thick line on the graph below).

Result: The average arsenic level for the samples collected was below the long-term comparison level.
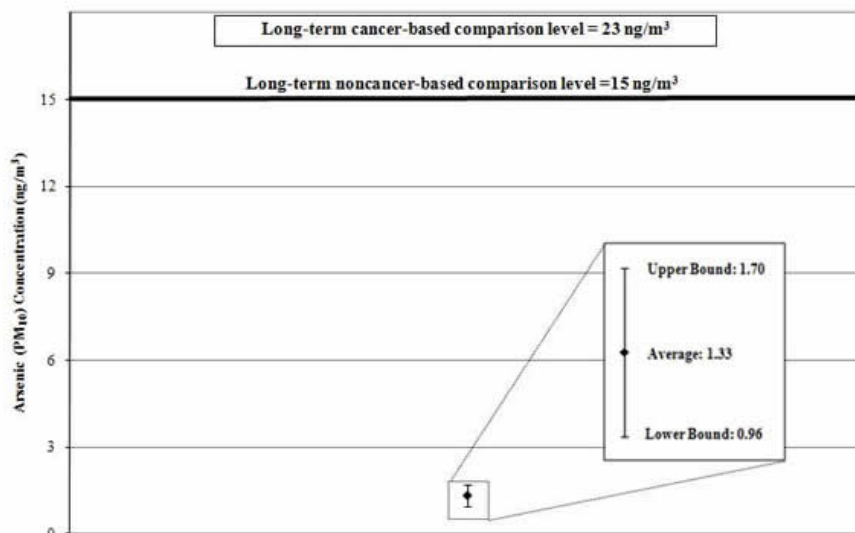
Tarrant Elementary School
Analysis: Arsenic Average

Long-term cancer-based comparison level = 23 ng/m³

Long-term noncancer-based comparison level = 15 ng/m³

◆ 1.33

2b. Calculate a range for the arsenic average: To account for varying air concentrations of arsenic, we calculated a range around the average by estimating high and low values that the longer-term concentrations might reach using common statistical tools. We compared the highest point in the range (called the "upper bound") to the long-term comparison level.

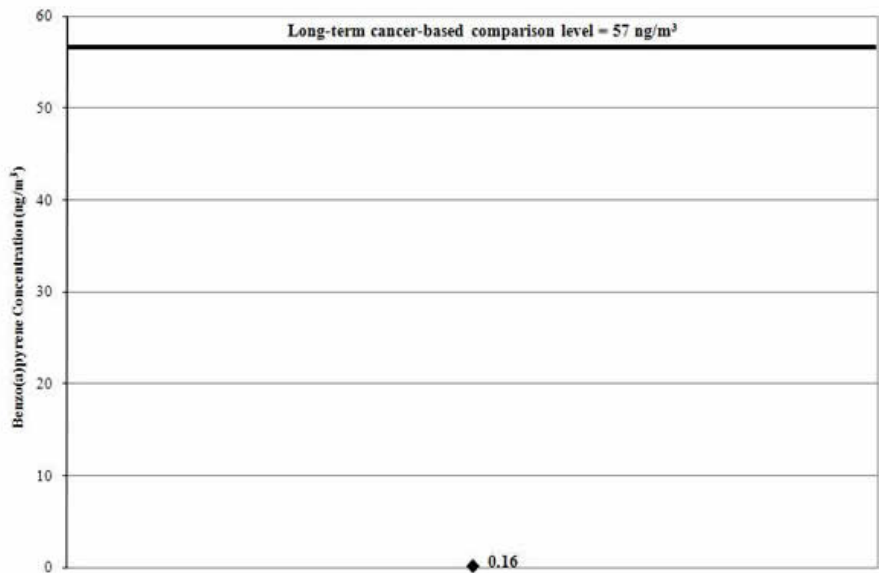**Result: The high end of the range is lower than the comparison level.**

Tarrant Elementary School
Analysis: Arsenic Range

Long-term cancer-based comparison level = 23 ng/m³

Long-term noncancer-based comparison level =15 ng/m³

Upper Bound: 1.70

Average: 1.33

Lower Bound: 0.96

3a. Calculate the benzo(a)pyrene average: We calculated the average of the benzo(a)pyrene measurements (shown by the black diamond in the graph below). We compared this average to the long-term comparison level (thick line on the graph below).

Result: The average benzo(a)pyrene level for the samples collected was below the long-term comparison level.

Tarrant Elementary School
Analysis: Benzo(a)pyrene Average

3b. Calculate a range for the benzo(a)pyrene average: To account for varying air concentrations of benzo(a)pyrene, we calculated a range around the average by estimating high and low values that the longer-term concentrations might reach using common statistical tools. We compared the highest point in the range (called the "upper bound") to the long-term comparison level.

Result: The high end of the range is lower than the comparison level.

Tarrant Elementary School
Analysis: Benzo(a)pyrene Range
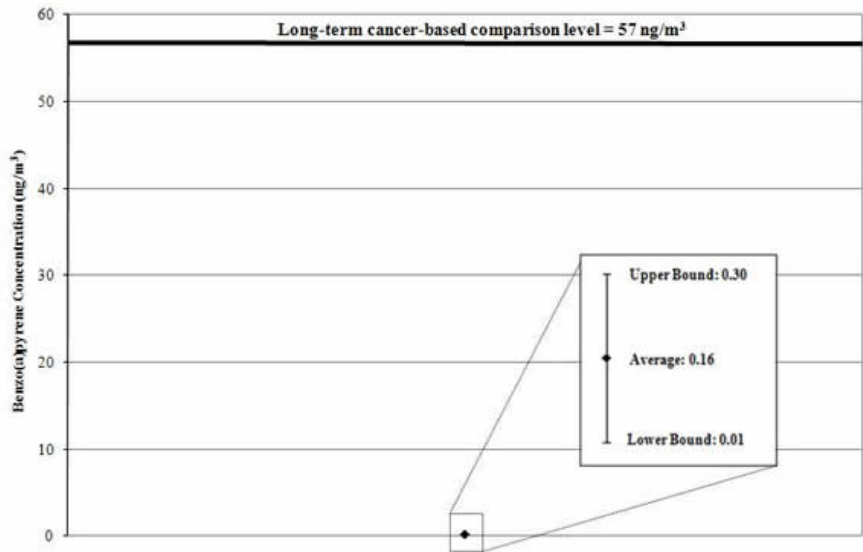
Analysis of Measured Wind Direction and Wind Speed at the School

We took measurements of wind direction and speed every day during the sample period. We took special note of the wind speed and direction on the days we took measurements of lead, benzene, arsenic, and benzo(a)pyrene.

What we looked at	What we found
We looked at whether the wind data taken on the days we took measurements of lead, benzene, arsenic, and benzo(a)pyrene are similar or different from the wind patterns during the entire sampling period.	We found the wind patterns taken on the days we took measurements of lead, benzene, arsenic, and benzo(a)pyrene to be generally similar to those observed during the entire sampling period.
We looked at whether the wind pattern during the sampling period is reflective of regional wind pattern over the long term.	Although we lack long-term wind data at the monitoring site, the wind pattern at the NWS station during the sampling period is generally similar to the historical long-term wind flow

pattern at that same NWS station.

Analysis of Information on Nearby Sources of Lead, Benzene, Arsenic, and Benzo(a)pyrene Emissions

What we looked at	What we found
Whether we could determine if the source were operating as usual during the sampling period.	Information from the nearby coke plant indicates that it was operating below normal production levels, approximately 60%of the production levels of a year earlier and a year later. Although information indicates pollutant emissions are not necessarily related to production at these coke plants.
	The concentrations of lead, benzene, arsenic, and benzo(a)pyrene measured at the school are lower than those suggested by the information that helped identify this school for monitoring.
	The nearby source of lead, benzene, arsenic, and benzo(a)pyrene has a Title V operating air permit issued by JCDH that includes operating requirements.

Additional Information

Technical Report for School: Assessing Outdoor Air Near Schools: Tarrant Elementary School (Tarrant City, AL) (PDF) (39pp, 388k). The technical report is geared toward risk assessors, risk managers, and other regulatory agencies.

Background on School Monitoring Effort

General Questions and Answers for School Monitoring Effort

Last updated on 2/23/2016